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The Province of Alberta

IN THE MATTER OF THE PUBLIC INQUIRIES ACT

AND IN THE MATTER OF O/C 290/73, AN INQUIRY INTO THE NEW TOWN OF GRANDE CACHE

N. R. CRUMP, Esq.,	Chief Commissioner
T. H. PATCHING, Esq.,	Commissioner
DAVID GRAHAM, Esq.,	Commissioner

W. A. Stevenson, Esq.,	Commission Counsel
D. O. Sabey, Esq., Q.C., and J. G. Martland, Esq.,	For McIntyre Porcupine Mines Ltd.

DATE: October 4, 1973

HELD AT: Edmonton, Alberta.

VOLUME XVIII

(Pages 1683 - 1770)

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I N D E X

VOLUME XVIII

October 4, 1973

WITNESSES:

KENNETH WARDELL

Examination by Mr. Stevenson 1683
Examination by Mr. Sabey 1730

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PROCEEDINGS before The Board of Commissioners at the Law Courts, City of Edmonton, Province of Alberta, commencing at 9:30 a.m., Thursday, October 4th, A.D., 1973.

MR. CRUMP: Mr. Stevenson?

MR. STEVENSON: Mr. Wardell.

KENNETH WARDELL, recalled on his former oath and examined by Mr. Stevenson:

Q Mr. Wardell, you acknowledge you are still under oath?

A Yes, indeed.

Q Mr. Wardell, I just want to go back for a moment; in evaluating and criticizing the decision to make the commitment to the long-term contract which the company made in 1968 and 1969, you acknowledge that you, of course, had the benefit of hindsight?

A Yes.

Q Was there any indication in the material available to the company to indicate caution or concern or give warnings in the matters that you have mentioned as being critical?

A Yes, in a number of the reports prepared by the consultants, particularly the Paul Weir Company, if I may put it this way, there were some warning signals flowing and even in the feasibility studies and reports prepared by the company's own people certain doubts and reservations were expressed.

Q What were those doubts, reservations or warning flags?

A There are quite a lot of them, sir. I don't know whether you

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A (continued) would like me to try to refer to them all.

Q Let us have the major ones, Mr. Wardell.

A If I may first look at the question of the geology and the exploration on which the geological information was based, and here I am thinking more in terms of the geological structure of the area than specifically in terms of reserves.

At page 6 of my report, at the bottom, Landes was saying quite clearly even in relation to the area where his exploration had been at its most intensive, if I may quote from his report:

> "It is essential that any coal mining in the South District Sector" -- that is No. 3 mine -- "as in the North District Sector" -- which was No. 1 mine and No. 2 mine -- "be preceded by development core drilling to fill in gaps in knowledge of the geology and of coal seam thickness and quality."

In other words, Landes was saying here, I have done my survey, I have made my calculations and made certain deductions from these but I recognize there are fairly substantial gaps in the information and further exploration is needed, specifically in the area between Sheep Creek and Smoky River.

Q And some of that was done, Mr. Wardell?

A Very little further exploration by means of core drilling, at any rate, was done between the Smoky River and Sheep Creek.

Q And the next point?

A The next point I think comes out in the 1965 report from the

A (continued) Paul Weir Company, some of which is quoted at page 13 of my report and in paragraph 1.22, quoting from that report, it was said:

> "It is likely that the recovery in the South Sector may be somewhat higher and in the North Sector somewhat lower because of the much thicker coal (difficult to mine the full thickness) and more disturbed conditions. It would be sheer speculation to try and establish recovery percentage more exactly until actual mining experience has been gained."

Q The South Sector is the No. 1 area and the North Sector is No. 2?

A No. 1 and No. 2.

> "There will undoubtedly be surprises encountered if and as actual mining develops, of a nature to affect reserves, recovery, mining methods and techniques, as well as costs. It is to be hoped that the surprises will at least balance out between good and bad. As regards available tonnage, however, there appears to be little doubt that there are sufficient reserves to support a mining operation of the size contemplated, or projected in the following sections of this report."

Q And what size was that?

A At that time Weir was speaking about a million tons a year.

Q All right, the next one?

A At page 30.

Q 30?

A 30, yes. Mr. Gardener, the mining engineer with experience in the Rocky Mountain, particular experience in the Rocky Mountain area reporting to Mr. Godin, said:

> "Successful pitch seam coal mining in the mountainous, soft bituminous coal areas of the Canadian Rockies, depends upon many factors. The location of an extensive area with few faults, uniform pitch and seams of mineable thickness is a prerequisite. Such an area facilitates proper planning of access, haulage roads, ventilation and drainage to assure minimum overhead costs. Direct mining costs are affected greatly by seam pitch, thickness and strength of roof strata, and these items in turn govern the extent and type of mechanization that may be adopted."

Q The next one? There is some more of Mr. Gardener's comments in 2.8?

A Yes, I was paraphrasing what Mr. Gardener was saying in my paragraph 2.8.

Q Yes?

A But basically what he was saying was in his view, and according to his experience, highly mechanized mining wasn't particularly adaptable to Canadian Rocky Mountain conditions.

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K. WARDELL - Stevenson Ex.

Q The next one, Mr. Wardell?

A The Weir Report of 1965 again quoted it. I might paraphrase at page 32. Weir were giving a quite firm opinion that initial production should be planned on the basis of one million long clean tons of coal a year with a possibility of increasing this to 1.4, 1.5, and he gave a quite definitive opinion that the property could not support an annual output in excess of 2 million tons.

Q Yes, Mr. Wardell.

A Page 39 and 40, which referred to the second report of the Paul Weir Company in 1967, the company, in fixing the terms of reference for the consultants had made two important stipulations: one, that the production planning was to be based on a million and a half long tons of clean coal in the first year and two million tons in the second, with an option to continue at two or to go to three million tons in subsequent years; and, secondly, that the production should be scheduled for 350 working days a year on two eight hour production shifts, and particularly in regard to the latter, the Weir Report said at paragraph 2.32, my quotation:

> "We believe that 350 working days per year will be difficult to realize....If 350 days do not prove practicable then the daily production requirements would be increased accordingly. Under such circumstances we believe it might be unadvisable to make a contract commitment for 2.0 million tons

A (Continued) annually starting in the second year in view of the limitations imposed by the nature and characteristics of the coal occurrences and the mining and labour (personnel) unknowns that will only be finally resolved or become evident through operating experience."

And again in relation to the labour question and going back to the December '65 Weir Report at page 44, they said:

"We see the recruitment of the necessary labour force as a probable major problem. We do not believe it is reasonable to suppose that the labour force as a whole -- assuming a sufficient number will, in fact be available -- will be composed of highly experienced coal miners, at least initially, if reasonable wage rates are to be maintained. If, for example, non Canadian Nationals should be employed to any extent, their adaptability to the local climatic and other conditions is at least open to speculation."

Q Yes, Mr. Wardell?

A And atpage 45, in the quotation from the preamble to the March, 1968, their company feasibility study.

Q This is McIntyre's own report?

A This is McIntyre's own report.

Q Who did this?

A I don't know who did it. It bears the name of Mr. Price, and the preamble said:

> "Evaluation of the possible mining methods applicable to the Smoky River operation has posed the largest single problem associated with the project. Various authorities have reported on this aspect of the operation. The suggestions have ranged from hand mining (Gardner and the first Weir Company report) to the retreat longwall system advocated by the D. H. Tweedy, Fletcher Stewart and V. H. Hulbert reports. Other suggestions have included mechanized room and pillar methods and hydraulic monitoring. More recently the possibility of open pit mining has been advanced. This latter method would of course be extremely attractive but requires considerably more study before it can be established as a definite possibility."

I should point out because the quotation goes on that the report expressed satisfaction that in spite of this they were able to have a viable project.

Q This one was based on one million tons a year, was it?

A Yes, the March, 1968 was based on one million tons a year.

Q Considering the opinion that the mining plan advanced in this report represents the best possible analysis of the presently

Q (Continued) known data, that was the one million long ton?

A That's right, sure.

Q The other points, Mr. Wardell?

A There is one small point at the top of page 48, which is also an extract from the McIntyre Porcupine feasibility study, which says:

> "(e) No. 4 seam picks up maximum cover of about 2,500 feet. This heavy cover would cause considerable trouble to a room and pillar operation in terms of roof control and "bumps"."

Another point at the top of page 52. It says:

> "Naturally the proposed mining plan will be subject to review by the operating management group when these people are hired."

If I might venture a comment on that at this moment, sir, it's how far one should proceed with their detailed planning and decision making on methods of mining and equipment and production schedules which you, before you have some operating personnel who are going to be responsible for implementing how far your operating personnel should be a part of the whole planning or preplanning situation.

Q That second report, the one you just quoted from, was the one predicated on three million tons?

A That's correct, yes. At page 67 paragraph 2.76, a comment made

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A (Continued) by Mr. Cook.

Q Who had been hired as mine manager?

A Yes. And shortly afterwards prepared a document "Preliminary Estimates of Capital and Requirements For Underground Operations". He makes the comment at 2.76:

> "The geology of this area of the Smoky River coal..."

and he was / here specifically referring to No. 5 mine No. 4 seam,

> "is even more unknown than the geology of the No. 2 mine area. In view of this uncertainty a certain flexibility in layout is essential in this area."

And at page 74, as part of the report again prepared by McIntyre personnel for the Japanese visit of August, 1969, about the middle of the page, it said:

> "It is considered that four longwalls and nine heading systems are quite able to produce an average 6,000 long clean tons per day to meet the target of 2 million tons per year. Some simple arithmetic together with some allowance for problems so often found in a mine, indicates that sufficient mining units have been purchased to meet the required outputs."

Of course, this was only true if the levels or output, which they were predicating for the

A (Continued) machines, was correct, and if they could work for the predicated number of days per week.

Q Was that anticipating 1500 long clean tons per day per unit?

A I beg your pardon?

Q Was that predicating 1500 tons per day per unit?

A Per longwall unit?

Q Yes, four units? How does that, can you interpret that in terms of machine shifts or something of that nature?

A Yes, I have a little difficulty because two types of machines are used and the figures are not very clear or specific in the report. But, first of all, we can look at the 6,000 long clean tons per day and make the presumption that this required approximately 9,000 long raw tons per day.

The nine heading systems were involved, this is nine continuous miner units that they would be operating each two shifts per day, and so you had 18 continuous miner machine units and for the longwalls you had four longwalls also operating two shifts a day, so you had eight longwall machine shifts, and so you had a very nice little equation of 18 times what would be the average production for a continuous miner per shift, plus eight times what the average production longwall would be per shift, had to equal 9,000 tons per day. So depends exactly what kind of figure you plug into each of the two variables, which are the output per machine shift for continuous miners and the

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A (Continued) output per shift for longwalls. But if you presume that the output per shift for longwalls was six hundred tons a shift raw coal, then the output per shift for the continuous miners had to be 433 tons on that simple arithmetical basis. If you increased the output per shift on the longwalls, then you decreased the output per machine shift required from the continuous miner units. By the same token if this was all based on a seven operating day per week, if you didn't achieve the seven operating day per week and you could only operate five, then instead of having to produce to maintain the bulk output, instead of having to produce only the nine thousand tons a shift, you had to produce twelve thousand, and that automatically increased your, the requirements you needed from both the longwalls and the continuous miners.

Q Those would be the calculations after some allowance or problems so often found in mining? Was there another point, Mr. Wardell?

A It spoke at the bottom of that page, about further exploration particularly in the No. 1 mine area and the No. 3 mine areas, and then went on at the top of page 75 to say,

> "All this propriety work is designed to obtain more information concerning the quality and mining conditions in these seams. Time is being made for proper testing, evaluation and selection of the more suitable mining systems in the conditions so found. The schedule for the complete 15 years has been drawn up to show the total reserves in each mine, the mineable reserves, and the annual output year by year. This is the master plan to which the three year action plans are geared. As mentioned earlier plans are already in hand to prepare No. 1 mine for production."

And the end of that paragraph, of the total, and this is still in quotation from the study,

> "Of the total mineable reserves planned for exploitation in these four mines, the 33.4 million tons, (over the contract period) represent 59 per cent. There is, therefore, a considerable margin of safety here too."

Q And what do you say about that, Mr. Wardell?

A Well, the bulk of the total mineable reserves were in this steep pitching areas of No. 1 and No. 3 mine, and only approximately 12 million tons were in the relatively low pitch areas, No. 2 and No. 5 mine, and it seems to me that the steeply pitching measures in which there have been no experimentation and there was little enough backup knowledge to regard that as an adequate factor, a safety factor or safety margin with really relying on hope rather than reasonable expectation.

Q All right, Mr. Wardell, now yesterday I had taken you forward into the operating period up to the decision to close the No. 5 mine, and I asked you if you had analysed the decision to close No. 5 mine on the assumption that some steps had to be taken to improve cost. That is, let us assume that some steps had to be taken commencing early in 1973 and before the end of March, 1973 to improve the cost picture, to demonstrate the improved cost picture. On that assumption what is your analysis of the alternatives that were open and the decision to close No. 5 mine?

A I wonder if I may say first of all, sir, in the sense one doesn't have to rely on the assumption. I think the situation itself was clear evidence that something needed to be done and needed to be done very badly. The mines were producing below output, productivity was low, and cost and subsequent losses were high.

So I think just looking at the picture

A (Continued) in general terms there were clear indications that this situation couldn't be tolerated indefinitely, and that some steps had to be taken to reverse this or to improve it, and I think the deteriorating situation was fairly clear throughout the greater part of 1972. I think the end of 1972 was probably the critical point in time at which it was evident that something at that stage, quite specific and categorical had to be done. And fairly certainly looking at all the constraints that existed, at the people whose interest had to be looked at, if I may put it in that way, they were the customers, the Japanese, and one was entitled to ask what was it that they were looking for in this particular situation about which clearly they must have been very greatly disappointed, and almost certainly the first thing they were looking for was to have their contract fulfilled, or to get 2 million tons a year which they had been told they would be supplied with. Secondly, that they would get it at some acceptable level of cost.

Then evidently there were the McIntyre shareholders who had already over several years suffered fairly severe losses, and they certainly needed to be sure that the situation at any rate wasn't going to get any worse, and preferably they were going to recoup those losses and move in a direction or towards the direction of profitability.

There was a question of the conservation of the coal in the ground. One really needed to maximize the quantity of coal that was available in Numbers 2

A (Continued) Number 5 mines that was available.

There were the miners and because of them really the whole Town of Grande Cache. Their requirements were that they should have continuing employment for as long a period as possible.

There were the Canadian National and Alberta Resources Railroad, and clearly it was to their advantage to have the output from the mines maximized. At that time they were carrying over the railways far less tonnage than they had anticipated.

So if all these interests were looked at, and when asked what the situation was which needed some kind of decision, it was really that one needed to increase output towards the scheduled contract tonnage, and if possible beyond that, and to reduce cost. If you increased tonnage or if you could increase the tonnage then automatically there were certain cost categories which would fall. I think particularly of the fixed annual costs for interest and depreciation, which if you produced a greater tonnage had a smaller unit cost effect.

There was the question of the preparation plant which was evidently working below its optimum or maximum capacity, and if you could put a greater output through the preparation plant then you would likely reduce preparation costs.

There were the site administration charges which also tended to be a fixed cost item per year, and

A (Continued) again if you could reduce output -- increase output it would reduce the unit costs of these.

Then finally there was the question of reducing the actual production costs themselves, and clearly if you envisaged a static situation where it got to the number of operators and the number of machines, there was only one way you were likely to do this, and that was to increase the machine shift, productivity from the machines.

So it seems to me that this was the broad situation that obtained, and what one really needed to look at was how do we increase output, total bulk output, and how do we increase productivity at the mines.

It was very clear that if you closed down any one of the three operations that were then going you closed off any real opportunity of increasing the output during 1973 over and against the output of 1972. No. 5 mine had produced in 1972 better than 600,000 tons of raw coal. So if you closed down any particular operation, one needn't think that it was No. 5 at this stage, but merely that that was an option that was open, you couldn't close down a particular operation unless you could replace that output from some other operation.

You could increase in relation to all three operations the number of days per week that were worked. You had no immediate opportunity of a rapid expansion in the labour force, and so you were constrained to a given number of men. You had no immediate opportunity for employing

A (Continued) more machines, partly because the locations in which those machines could operate in Numbers 2 and 5 mines were limited, and you couldn't easily employ any more machines.

So this was the picture in terms of total output, and it seems to me that looking at the constrains that existed, if you wanted to increase total output the only way you would have to do this, apart from the question of going to the seven day week, was to increase productivity and particularly to increase productivity at the underground mine. You were then entitled to say how will I increase productivity at the underground mines, given that this will be declining over two or three years.

In my judgment there was only one, there was only one answer to this, and that was that some at least of the decline, and I have not seen any very carefully documented time studies which help me to decide exactly where time was being lost and exactly why productivity on machine shift declined, but looking at the picture in the broad it seemed to me that the better productivity was obtained in the earlier days of the operations, and when depillaring was at a maximum compared with development work. At this particular time both Number 2 and No. 5 mines were much more heavily involved in development work than they were in depillaring.

A (continued) So, one possibility of increasing productivity per machine shift was clearly to put the machines on depillaring rather than on development work.

So these were really the two things, this would have automatically, if you could achieve increased productivity per machine shift in the two underground mines you would automatically reduce production costs, which was beneficial in itself, you automatically increased output given that your labour force and number of operating machines was stable and, you therefore automatically increased output and ipso facto you automatically decreased the unit costs on the fixed annual sense. So, if the primary object was to satisfy or endeavour to satisfy all the interests that were involved in a decision at this point of time, one was clearly seeking to maximize bulk output and to maximize productivity at the two underground mines.

I think this was very clearly recognized in the decision that was taken because it seems to me it was taken on this presumption that output would be maximized by operating the mines on a 7-day-week basis and productivity would be improved in the over-all situation by increasing the proportion of coal coming from No. 8 mine, the strip operation, by increasing the proportion of coal coming from No. 2 mine which had, at any rate over the year 1972, a better record in terms of productivity than No. 5 mine had had. It seems to me that these were the two factors really that entered into the equation.

Q You mentioned a moment ago you would try to determine why the productivity had fallen off in the underground mines or what the problems were, how would you do that?

A Well this would have meant doing a detailed study, machine by machine, shift by shift, showing the number of minutes the machine was actually operating and doing its work, how many minutes in any particular shift were occupied with other matters like supporting the roof or moving the machine, repairs and maintenance and so on. Basically if you are only going to get 250 tons production from a machine one day and 400 another the machine is not cutting for the same number, cutting and loading for the same time for 250 tons a shift as it did for 400, and there has to be some reason for this and the only way you can find out basically what the reasons are, where the down-time is, why the machine is producing at a given average level of productivity rather than at some other figure, is to do a very careful and detailed time study.

Q Would your operating personnel have some general idea as to where the time was being lost?

A Would certainly have some general idea, no question about that.

Q Whether it was being lost in difficulty in development work or problems with machines or whatever?

A Surely.

Q Could you get information from your operating personnel as to the general nature of productivity problems?

A No. A major problem in talking to the people at the mine during May and August of this year but on the whole there were

A (continued) few people who had been there throughout the whole of this period and so it is very difficult to get a complete and coherent picture of all the factors that went into this general decline in productivity. I attempt to give some of them here but these are the fairly obvious ones and there may be, I say this here, there may be others that there was not sufficient information to enable me to elucidate.

Q So you couldn't check that yourself?

A No.

Q Now, would you go ahead please, Mr. Wardell?

A Well it seemed to be basically, that clearly given the situation as I have endeavoured to describe it, a decision had to be taken to improve the situaton. The question that I asked myself was, was the closure of No. 5 mine the only decision that could have been taken and, if it wasn't the only decision, was it necessarily the best one that could have been taken in the circumstances, and it seemed to me that looking at the consequences of the decision certainly the closure of No. 5 mine wasn't the only action that could have been taken. One could have closed down all the underground operations and said they are too expensive, we don't see much prospect of improving this, let's cut our losses and just operate with No. 8 strip until such time as we can get No. 9 into operation. That was clearly a possibility. One could have said, let's close down No. 5 mine and continue No. 2 but since the bulk of No. 2 is on development work anyway let's now depillar No. 2 because this way we have some reasonable expectation of a greater productivity from No. 2

A (continued) as of now, as of January.

Q Would you lose reserves by doing that?

A No, on the premise that you were still able to go around through the Sheep Creek side and mine No. 4 seam in from the Sheep Creek side, you weren't in that sense losing reserves because you could pick up the area you haven't worked.

Q That is what is now proposed?

A And that is what is now proposed; or, you could go whole hog and say fine, if I close No. 5 now at least I run the risk that I won't get back into that area to mine the remaining reserves successfully, that there are likely to be many, many problems. So, the best thing I can do in this situation is take what I can get at the best level of output and productivity I can get. In other words, I can depillar No. 5 and my judgment is that at that point in time the course of action most likely to have the consequences that were most required, i.e., to increase output, to improve productivity and to decrease costs would have been to have depillared No. 5 and No. 2 mines and this might very well, and I can't say with absolute certainty, but it seems to me there was a very good prospect that had this been done, output from No. 2 and No. 5 would have increased, productivity would have increased, and given that output and productivity increase, then very clearly there would be lower unit costs of production, and in using that expression I mean the costs of production to putting the coal into railcars at Smoky River.

Q Mr. Wardell, if you were looking at the two mines, was No. 5

Q (continued) demonstratively or conclusively higher cost than No. 2 or lower productivity than No. 2?

A It rather depends upon the period at which you choose to look. I put out a table of figures at page 104 of my report.

Q Those are productivity and cost figures?

A Yes, output, productivity and cost.

Q And how can you compare No. 2 and No. 5 to decide whether or not closure was demanded or necessary or advised?

A It may not be simply a question of comparing No. 2 and No. 5. It may be quite definitive limit that one has to say when the cost for a given period of time exceeds a certain level that mine is no longer, unless I can get it back again, is no longer economically viable, so it has to go out. So there is, somewhere, an absolute limit and of course then the comparative position as between the two mines.

Q My question to you was directed on the basis of what Mr. Fulton said, of the two mines the heavier costs and the lower productivity were in the No. 5?

A Surely and, if one looks at the whole picture for 1972 that is unquestionably true. The output for 1972 was 631,693 long raw tons as against 847,029 tons at No. 2 mine. The output per machine shift at No. 2 mine for the whole year had averaged 354 tons at No. 2 mine and 312 tons at No. 5 mine and the average unit production cost --

Q For the year?

A For the year at No. 2 mine averaged $5.61 and at No. 5 mine

A (continued) $6.72. So fairly clearly looking at the year as a whole, No. 5 mine was an indifferent performer, if I can use that expression, compared with No. 2 mine. It is very difficult to know at what precise level of cost or output of productivity there is an absolute cut-off point, a break-even cost, if you like, where one can say that if the cost goes above that and there is no possibility of retrieving the situation then that mine has to go because we can no longer afford to operate it at that level and I don't know what that cost was or even whether such a cost was considered or broken out, but if you look at the month-by-month figures for the two mines, now I am merely looking at the comparative basis, it is fairly evident that No. 5 mine had a very poor first quarter and if one looks at the costs for the first three months they are quite significantly above the average for the year and broadly speaking the same was true of the greater part of the last quarter of 1972.

I haven't been able, from the information available to me, to find too satisfactory an explanation for the relatively low productivity, relatively high cost in the first quarter of 1972 in No. 5 mine but certainly in the last quarter the situation was quite materially affected by the labour dispute and by the requirements of the Mines Department about resupporting the roadways, so there is some explanation for the last quarter's costs that one can see for relatively low productivity and relatively low cost in the last quarter. But then if one looked at the last half year of

A (continued) 1973 a fairly different picture --

Q 1972?

A I beg your pardon, 1972 -- presented itself. The two mines during the last half year produced at approximately the same total quantity of coal, 334,419 at No. 5 and 376,632 at No. 2, and I don't suggest that either of those two figures gave anybody cause for satisfaction.

The productivity over the same six month period at No. 2 mine and No. 5 mine was 340 tons a machine shift at No. 2 mine and fractionally better at 343 tons per machine shift at No. 5 mine, in spite of the fact that in that last quarter there had been certain problems and difficulties associated with the labour dispute and the additional supports that had to go in and equally over that last half year the costs were fractionally better at No. 5 mine than they were at No. 2 mine.

So, if one looked at the picture over the last half year there were not conclusive reasons for saying we must close on a comparative basis, we have a better argument for closing No. 5 than No. 2 mine just looking at the figure alone without considering the mining implications and the operational implications.

Q Mr. Wardell, did the company have reason at that time for believing that in fact the costs in No. 5 might improve in 1973?

A I don't really know whether they had any reason but there is a document in the files which was the budget for the mines for

A (continued) 1973.

Q Prepared when, can you tell?

A To the best of my knowledge the document itself isn't dated but from other correspondence in the file attached to this document, some time about or after November 20th, 1972, and that document said for 1973 that No. 2 mine costs were expected to increase from a projected $7.77 for 1972 to $8.46.

Q That is per clean ton?

A That is per clean ton. I worked out the figures per raw ton if that would be helpful, the relative costs per raw ton in relation to the figures I have given were $5.08 and $5.64. That is on the presumption that the yield through the preparation plant was 66 per cent.

Q That is they estimated the cost would go up to $5.64 per long raw ton?

A That's correct.

Q And that from the projected $5.08 in No. 2 mine?

A That is correct. It was on this basis anticipated that the average cost for 1972 would be $5.08 and that this would increase to $5.64 a long raw ton during 1973.

Q And for No. 5 mine?

A At No. 5 mine the costs were expected to drop from $8.75 a long clean ton in 1972 to $8.23. That is to drop from a long raw ton coal cost of $5.83 to $5.49.

Q That is below the projected costs for No. 2?

A That is correct.

Q Do you know why that difference was going to be encountered,

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Q (continued) does the report indicate why?

A In the broadest terms, yes. For No. 2 mine for instance, it says labour costs for 1973 should drop 23 cents while material costs are expected to increase 92 cents. That was a net increase on cost and at No. 5 mine it said labour costs should reduce $1.05 while material costs will rise 54 cents.

Q And it doesn't say whether that's going to be achieved by increase in productivity or some slight decrease in manpower?

A No, no.

Q Would you have anticipated an increase in productivity if No. 5 mine had been turned to depillarage?

A Yes.

Q And was it pretty well at the end of its development stage then at the end of 1972?

A Well, it certainly wasn't at the end of its development stage in terms of the mine planning that had been done. If one looked at the mine plan, it was clearly intended that development should go on to the depth of the existing workings and down to a depth of cover in the order of 2,500 feet and, sir, if you would like to see a plan of this, there is one in the August 19 -- or the report prepared for the Japanese visit earlier this year. It's a thick report with the initials Mr. R. B. Fulton on it.

Q Does this show on any of your large plans, Mr. Wardell?

A I beg your pardon?

Q Does it show on any of your large plans?

A No.

Q At any rate, development could go on?

A Development was projected to go on.

Q Under the original plans?

A Under the original, under the original plans, but evidently

A (Continued) the situation was already a somewhat continuous one. The main entrance for the No. 5 mine was already under a cover of about seven hundred feet and meeting fairly steep pitches. If they went any further it was fairly clear that the cover was getting to increase and probably if one extrapolated the geological information the pitch was going to increase too. It was equally clear that all the coal on the dip side of the one set of entrance which had turned north and eastwards, if I get my points of the compass right, was at a depth well in excess of a thousand feet, and I had judged that some, at least of the problems of mining and development were associated with a rapidly increasing cover. I think there was a fairly considerable uncertainty about the ability to mine the coal on the dip side of the entrance that had then been driven. So on this basis, I wouldn't have felt that to have depillared the No. 5 mine would have been to have sacrificed certain economically mineable reserves that had not at that stage been developed.

Q It was what was then developed?

A That's correct.

Q It probably wasn't economically recoverable on the basis of the costs and the geology available?

A That's right.

Q Now, the coal that was left in the pillars in No. 5, is it recoverable?

A As of now --

Q As of now?

A I think not.

Q And how much coal was left in the pillars of No. 5 that could have been moved if they had been depillared?

A According to my calculations, assuming or making certain assumptions about the areas that could be depillared approximately a million tons.

Q And would the decision to close the No. 5 mine made early this year have rendered that million tons unrecoverable?

A In my opinion, yes.

Q Do you have any other comments to make on the decision to close the No. 5 mine, Mr. Wardell?

A Well, I think all one can look at then are the consequences of the closure. I have no means of knowing what effect, if any, it had on the customers, on the Japanese. I have no means of knowing whether it was effective in restoring, if indeed confidence was lacking, and restoring confidence or what precise effect it had.

It seems fairly evident that as things have developed so one knows this is a matter of history now rather than as a matter of trying to put one's self in the position at the end of January, that the hoped for consequences of closing No. 5 can hardly be said to have been fulfilled. There was first the failure to dissuade, if that's

A (Continued) the right term, the miners to operate the No. 2 mine on a seven day a week basis. Secondly, up to this time, there has been a continuing decline in productivity at No. 2 mine, and unless something quite dramatic happens in the last three or four months of this year, No. 2 mine certainly isn't going to produce the output scheduled for it at the time of closure or at the cost scheduled for it at the time of closure. In fact, the costs as of today to the end of August are considerably higher than they were for 1972 and also higher than were the costs at No. 5 mine during 1972, and 140 men have presumably, well, I don't know whether exactly what the number is, but a fairly substantial number of men departed the area in Grande Cache. Many of these must have been trained and experienced miners and I can only imagine would be very reluctant to be persuaded back into the area again.

So it really means in effect that once the decision was taken and once the men had gone, then what was going to be produced from underground mines was going to be with the men very logically that were available without starting another program of recruitment and retraining. So it seems to me these are the consequences of the decision which one can look at in terms of what one knows has happened since the end of January.

Q To what extent were those consequences foreseeable, or perhaps put it another way, not foreseeable?

A So far as the seven days operating is concerned for the underground mines and given that many of the miners or the underground miners were British and some from Nova Scotia, I don't know exactly what the proportions were, given the agreement that had previously been negotiated, given the fact that when there was a seven day underground mining operation going in the early part of the mine, there was a very high rate of absenteeism, which would appear to be one of the major reasons why it was abandoned. It seemed to me that the expectation that the underground miners would operate the mines seven days a week didn't really have any justification, unless you had gone along at any rate to them first and said, "Look, this is a highly difficult situation. We are pressured to increase output, decrease costs. One of the ways that we can do this is to work seven days a week. We know this is a break of what's already been agreed with you, but without your cooperation we are going to be in considerable difficulties. We may be faced in closing No. 5 mine down. Are you prepared to do this?" But that would have to be done before the decision was made, not after, as I see it.

Q Any of the other consequences not foreseeable?

A I think so long as No. 2 mine continued on development, as it has done, with a relatively small amount or no amount of depillaring, there was no reasonable expectation that productivity from that mine would increase. An additional continuous miner was put into the mine, which gave some hope

A (Continued) of increasing bulk output, but really that was the only, in a sense, specific and effective thing that could be done in that respect. I think, and if I used the terms, I don't pretend to any expertise in the field, but from the psychological point of view, the effect of closing No. 5 mine down on miners left working in No. 2 mine, it seems to me couldn't have been all that encouraging, and I have no means of knowing which miners on a voluntary quit basis departed, whether the ones who stayed were those who really wanted to stay or those who didn't think they've got much chance of getting a job anywhere else, or exactly what the consequences of this were, but it seems to me that if one had looked at this kind of consequence, there were fairly grave uncertainties about this.

Q Do you have any other comments to make with respect to the closure of No. 5, Mr. Wardell?

A I think no more than the comments I make formally in the report that in my analysis of the situation I don't think the closure of No. 5 is necessary, and I think, I don't think even at the time it was a wise decision, and I think the subsequent history of No. 2 miners tends to support that view.

Q All right, Mr. Wardell, let's look at the future reserves, future prospects for underground mining, which is part C of your report, is that correct?

A Yes.

Q Now, have you made a computation or compilation of the

Q (Continued) probable economically recoverable reserves that are now available?

A Yes.

Q Is that the one at page 117?

A That's correct.

Q And how do you characterize these reserves? Do you describe them as being economically recoverable at the present costs or recoverable at some cost or how did you come up with these figures?

A I don't, of course, have any precise cost figures which I can or would seek to apply to these reserves. I think the economic mineability of the No. 4 seam, I have to be very careful here because I don't know exactly how to categorize the economic mineability of No. 4 seam. For instance, if I have to take the cost figure of six forty-two dollars, which was the cost figure at which No. 5 mine was closed down, then I think it's true to say I don't have any reserves in No. 4 seam that are economic -- if that's the economic cutoff, I don't have any reserves left in No. 4 seam that could be worked at that level of cost.

Q Because today's costs are higher?

A Yes. But workable there at some level of cost. It's a question of whether that level of cost is going to be acceptable to, in relation to the realization from the Japanese and in relation to the company's affairs. Given that it is then I think that one could probably include the No. 4 seam reserves

A (Continued) as economically recoverable, but I have to make that qualification about it.

No. 10 seam is, of course, at a lower order of certainty in terms of operating costs, partly because very little development has so far been carried out in No. 10 seam and what little development has been carried out hasn't, so I understand and from my own view of the little area that's opened out, it doesn't hold that very great expectations that it's going to be a more economical proposition than No. 4 seam, for instance.

No. 11 seam, again has, for the moment, relatively little ground opened out and we have no clear definitive indications as yet that this is likely to prove a more economical mining proposition than No. 4 seam. So I am handicapped first by not knowing strictly what figure I can reasonably put on what is, were our economical reserves in terms of a cost. If I could say $10.00 or less, then I might very well include all these reserves. If I were to say that it was $9.00 or less, I might only put in No. 4, and I don't know exactly the present circumstances relating to the whole financial situation, how one fixes exactly what the level of cost is.

Q But assuming that the kind of operations that are being carried on now are economical, you've made these assessments?

A That's correct, yes.

Q And you get a total 12.3 million long raw tons --

A That's correct.

Q -- of recoverable reserves?

A That's right.

Q And you list those as mine areas 2, 2A, Reiff Terrace and 5?

A Yes.

Q You didn't make any allowance for the No. 4 seam in the 5 area?

A No.

Q You consider that irrecoverable?

A I do.

Q Now, in your report you indicate some concern about the order in which the seams are mined. What gives rise to that concern, Mr. Wardell? You make a qualification in the report?

A Yes. Problems always arise in mining where you have what the miners call a multi-seam working situation, I mean where you have more than one seam to work in the same area. The problems arise largely because if you extract one of the seams, if you disturb to some extent the strata around those workings and if another seam is included in the total area of disturbance then you affect its condition. You may affect its condition in terms of its support, in terms of its workability, in many ways, but you will or may affect it. The bulk of the effect occurs above an extraction area. There is also some effect from below, but if you mine out an area in a particular seam then the bulk of the disturbance, the collapse of the immediate rocks, the deflection of the overlying rocks, and the general area of substance that follows total extraction in the

A (Continued) seam has its greatest effect upwards towards the surface. This is simply the effect of gravity, of course.

So logically and almost a first principle in mining engineering, if you are in a multiple seam extraction situation the simple logic is you start with the top one and work downwards. Most of the problems are above the seam you are working and if you work the top one first then you affect the strata above it. You come to work the next one and all you are affecting with the workings in that is what you have already done, which you are not concerned about, and so on down the sequence.

Of course that is a very happy and ideal state of affairs, and while mining engineers regard it as a good first principle that one properly ought to be followed there are quite a lot of other considerations that enter into the choice of where you start to mine first. Not necessarily for the best seam but for the one which for the time being has a ready market for instance, it might be one of the considerations.

You might go for a seam which has essentially and preliminarily the lowest production costs, and you do that on the basis that you may thereby accumulate somewhere or pay off your fixed costs rather rapidly, and when you come to work the other seams and you got higher operating costs, at least they don't have to bear the other fixed costs. There are a good many reasons, and what I am saying is it is by no means universal that one would choose, although it's a correct principle to follow,

A (Continued) one would choose to mine in descending order.

Q You indicate that there is danger of some effect on the upper seams, have you made any discount in your calculations for that?

A No, I have presumed here that if one sought to maximize simply the resources in the ground one sort of maximizes the recoverable coal, then one would be obliged almost to work the seams in descending order.

Q And you indicate that the economical mineability of seam No. 10 is suspect because of anticipated relatively poor roof conditions. Have you made any discount for that?

A No.

Q And you indicate that No. 11 is something of an unknown quantity. Have you made any discount for that?

A No.

Q And you indicate that there was some increased cost, trucking costs to add to the mining costs for the No. 2A and Reiff Terrace Mines. Have you made any discount for that?

A No. I would just like to make a comment on that particular point because the present situation or the present intention of the mine is to seek to drive tunnels in No. 11 seam through to Sheep Creek and ultimately to bring coal from the No. 9 mine. Certainly from the Reiff Terrace mine and probably from what I have called the No. 2A mine, which is the reverse side or the Sheep Creek side of No. 2 mine through those tunnels. The problem here as I see it is that a decision has also been made to depillar No. 2 mine No. 4 seam. So

A (Continued) the tunnels that would be driven in No. 11 seam and the substantial part of them overlies the areas which fall to be depillared in No. 2 seam. So there is without question some uncertainty the effect of the depillaring operations on the driving of the No. 11 seam tunnels, and to avoid that uncertainty it seems to me there are only two alternate courses of action one has to note to depillar in 2, No. 4 seam immediately beneath the area of the No. 11 seam tunnels or to abandon the attempt to drive those tunnels in No. 11 seam and get full depillaring advantages from No.2 seam and to bring all the coal from 2A and the Reiff and the No. 9 mine around by the trucking route and not through the mountain.

MR. CRUMP: Mr. Stevenson, this might be an opportune point to recess for 20 minutes.

(The hearing was adjourned)

(The hearing was resumed)

MR. CRUMP: Mr. Stevenson, have you any further examination of Mr. Wardell?

MR. STEVENSON: Yes. Mr. Wardell, you indicate 12.30 million long raw tons in your chart, and you deal with that as being the short term prospects for underground reserves?

A Yes.

Q In the mid term areas you refer to No. 9 and No. 14 areas or 1 and 3. I take it 1 and 3 are dependent on some technological developments?

A Yes indeed. No. 1 mine is currently in the course of development by Keenala Mines, but to the best of my

A (Continued) knowledge and my last visit this hadn't progressed very far. I had some discussions with Professor Keenan, who is in charge of this operation, and my understanding of what he told me was that this was intended to be a longwall operation in steeply pitching conditions, and Professor Keenan had some particular experience of mining longwall in steeply pitching conditions, and feels that he has some expectation for success at No. 1 mine.

Q But you haven't taken that as being economically recoverable in your figures?

A No, not in the present state of knowledge.

Q And is the same true of No. 3 mine area where hydraulic proposals are being considered?

A Yes, basically the same is true.

Q You haven't taken No. 9, the deep area of No. 9 as being economically recoverable, why is that? What factors are of concern there?

A First of all I have no way for the moment of defining what part of the No. 9 mine area will ultimately become available for underground mining. Much depends upon the areas which are ultimately stripped and there is still some uncertainty as we heard yesterday from Mr. Boyd about the strip ratios and just how far stripping might go, and also it would be a question at No. 9 mine unless some special area was left for the purpose of putting entries into No. 4 seam at No. 9 mine in the high wall of the open pit. I don't know if that is very clear or not.

Q There is going to have to be some planning in the pit operation to preserve the underground entries?

A Yes, if indeed there is ultimately any bona fide intention of, I say intention, I don't mean that one might not have the intention, but any bona fide possibility of extensive underground mining in No. 14 area --

Q No. 9 you mean?

A I beg your pardon, No. 9 area. And, of course, one also has to add onto the mining costs a cost which doesn't exist at any rate in respect of the present No. 2 mine, and that is the cost of trucking or transporting the coal from the No. 9 mine area through to the present mine site.

Q And the No. 14 areas to which reference has been made, you haven't included it. What are the reasons for not including it, Mr. Wardell?

A (continuing) I haven't included it again in the short-term position because, to the best of my knowledge there are, no plans have been prepared even in the broad sense for underground mining at No. 14. The matter has been considered. In other words it said there are reserves in the 14 mine area at relatively low pitch in No. 4 and other seams which could be mined by underground methods and by more or less conventional or traditional equipment, i.e., with the techniques that are already available but, little enough is known about the particular conditions that exist there as compared with No. 2 or, indeed, with No. 5 mine. They may be better, they may be worse, and added to that is the problem of getting at the coal which is fairly high up the mountain and again of transporting that to the mine site. So just as I had a difficulty with knowing what kind of figure to put on what was economically mineable in the case of No. 2 mine and 2A and Rieff Terrace, I have even greater difficulty in putting a number on the four mine areas I have mentioned here for the reasons I have given.

Q I want to go back to one point, Mr. Wardell, in your original exhibit there is a map K.W.9?

A Yes.

Q Which is No. 5 as of the time it was closed, is that correct?

A That is correct.

Q And the various colours indicate the various stages of the workings?

A That is correct.

Q Which areas Mr. Wardell, could have been depillared but were

Q (continued) left, could you just show us?

A I had better get a ruler to point to it, I would have a little longer reach.

The area which contained these pillars back to here, the area containing these pillars, the area containing these pillars, the small area here and the small area here.

Q So it is basically in what is coloured green in the upper left-hand corner?

A Yes.

Q And yellow in the lower right-hand corner?

A Yes.

Q The blue in the centre?

A Yes.

Q Lower centre, and the red?

A Yes. Some part of it. The precise dimensions of what could be depillared are a matter of some little conjecture, of course. There is also incidentally an area down here.

Q The gold area in the lower left?

A Yes. But these are the areas, certainly the areas here were substantially lost. As much depillaring as could be done there had been done.

Q That is in the yellow in the upper right?

A In this area and this area and very largely in this area. And also it seemed to me to an extent in this area. At the time of the closure headings were being driven here.

Q That is in the green area running towards the lower right corner?

A So that really this left substantially only the areas associated with the entries going in a northeast direction and with the main entries and to a smaller extent the submain entries near the mine mouth which had also travelled in a northeasterly direction.

Q And you calculated that at a million tons?

A Approximately, yes.

Q Do you have any other comments with respect to the development of other underground reserves, Mr. Wardell, beyond 10 years?

A Beyond 10 years it seems to me that the bulk of the underground mining reserves are bound to lie, for the most part, in the steeply pitching areas.

Q And that would require technological development?

A I have some difficulty with the concept technological development rather implies something quite new, fairly revolutionary. What is being considered, for instance, in relation to No. 1 mine is longwall mining and the particular technology that would be introduced into that situation, which might give it some possibility of success, would be to have supports for the longwall, for instance, which didn't suffer the same fate as the supports in No. 2 and No. 5 mine. They are still essentially powered hydraulic supports. They may be of somewhat different design, but in principle they are the same or a very similar type of equipment. It is not in the true sense a technological development and I think the same is true of hydraulic mining, the techniques are well known. The problem is there applicability at an economic level in these particular circumstances.

Q As of today you don't consider the 9, 14, 1 or 3 areas on the information that is available, as giving you economically recoverable reserves?

A Not with any confidence.

Q All right. Mr. Wardell, I want to ask you a few questions about the market for these coals that we have heard so much about. Have you made some studies of the markets for coking coal? Or the marketing of coaking coal?

A As I mentioned yesterday, I have been closely involved as consultant to the British Steel Corporation over a period of about three years, so I may state that I understand pretty well the British situation and have a broad comprehension of the European situation in terms of coking coal and even broader but less detailed and specific knowledge of the worldwide coking coal situation, but very largely what I know about the circumstances is influenced and informed by my knowledge and experience on behalf of the British Steel Corporation.

Q Have you examined coking coals in North America for the British Steel Corporation?

A Yes, both in Canada and the United States.

Q Now, the Japanese appear to be the main foreign buyers at the moment, is that correct?

A That is correct.

Q Do they rely on any one type or quality of coal as constituting the major component in their coke production?

A Not to the best of my knowledge. The Japanese situation is, they have a certain production from their own indigenous mining

A (continued) operations which is not a high quality, so-called, or metallurgical coking coal but which can be used as part of a coking coal blend and they purchase out from various countries coking coal which is suitable for blending with their own home-produced fuels, but their own home-produced fuels are relatively small proportionately of the total blend. I say this because the situation is quite different in Great Britain, for instance where we have a very large home based production, where the importation of coal from other countries is only expected to constitue a quite small proportion of a blend.

Q Would the Japanese blend a number of different coals then?

A My understanding is that the Japanese, for the purposes of making coke for their blast furnaces may blend anything up to 20 different types of coal, as few as 10 but certainly up to 20.

Q Now, they use some quantity of low volatile coal such as is produced from the McIntyre mines?

A That is correct.

Q Is low volatile coal essential to the steel-making process? Is it material that the Japanese or U.S. for instance, must have at all costs?

A No, in strict terms it isn't. Coke can be made from a variety of coals. With a low volatile, or a medium volatile or high volatile, a good many coals have coking properties which isn't just specifically related to the volatile content and some countries have no high volatile coals at all, nor do they have the resources to acquire them. India would be a good example, for instance, where all their coke for their blast furnaces is

A (continued) made from a medium volatile, 26 or 27 volatile coal, but the problem is essentially this, that what the steelmakers seek to do is to minimize the quantity of coke required to produce a ton of pig iron and the Japanese, of course, have been able to do this to a fine art and certainly have the lowest tonnage of coke per ton of pig iron produced of any steel manufacturing country, again to the best of my knowledge. So, this affects the economics of the blast furnace operations and the pig iron production. So, if you want maximum economics, if I may put it this way, a minimum cost for producing a ton of pig iron, then you seek to get the best conceivable blend of coal for coke-making purposes that you can and if you don't have it indigenously then you have to go out on the world market and buy it from those people who have.

Q If the cost of the low volatile coal that you seek escalates substantially, can you still carry on your steel producing operations with other qualities of coal?

A Yes, indeed.

Q Did this situation attain in the United Kingdom prior to the embargo that you mentioned the other day?

A Oh, yes, sir, all our metallurigical coking coal was taken from indigenous sources but Britain was particularly short of low to medium volatile coal for improving the blend and improving the quantity of coke needed to produce a ton of pig iron, so the embargo was raised, generally speaking, to facilitate the efforts of the Steel Corporation to decrease the costs of

A (continued) producing pig iron and therefore decrease the costs of producing steel.

Q But I take it the result is this, that the quantities of other coal or the quantity of coke used, that the quantity is determined by the cost of that coke in relation to your steel operations or your pig iron operations?

A Yes. I think perhaps I might illustrate the point very simply by saying this. At this moment if the Steel Corporation had to pay, for instance, $30 or $35 a ton f.o.b. Hampton Roads for high volatile coking coal --

Q High volatile or low volatile?

A Low volatile, from the United States, it would be cheaper to use the British coals of higher volatile even though the quantity of coke per ton of pig iron used would be greater. In other words, the relative economics would change very considerably if the price escalated very rapidly.

Q The low volatile coals are not a commodity that the steel industry must absolutely have?

A Not must absolutely have. It is beneficial for them to have them to improve their coke quality and the blast furnace and steel-making economics.

Q And you use the example of the British Steel Corporation, this requires consideration of the various coking qualities and various costs and all these combinations to determine what can be paid for low volatile coal?

A That is correct.

Q And that depends on the cost of substitute coals of lower

Q (continued) quality and the price of steel, all these factors?

A Yes. I may say and I think perhaps it would be appropriate to say, that since Japan couldn't in fact be self-sufficient in its own indigenous production, it always, unlike Great Britain, has to go out on the market and purchase, but what it purchases and at what level cost is still related back to the economics of the coke and blast furnace production. I am not sure whether that helps or not.

Q That is all right. We have been told some amount above the effective supply and demand in the price of steel and my question basically is, can we be assured that the Japanese, being the main buyers at the moment, or the steel industry as a whole will always demand low volatile coal regardless of the price?

A Certainly not regardless of the price.

Q And you say that in the British experience they can calculate an economic breakthrough, breaking points, above which the won't go?

A That is correct.

Q Regardless of the costs to the Americans or the Canadians or anybody else producing the coal?

A That is correct.

Q That is all the questions I have.

MR. CRUMP: Mr. Sabey?

MR. SABEY EXAMINES THE WITNESS:

Q Mr. Wardell, you have been on the stand a long time and you have a long brief here and I will try to be --

A Mr. Sabey, I wonder before you start I might have a little more water?

MR. SABEY: Please, let me.

Q MR. SABEY: Mr. Wardell, on this last point before we get into your brief, on this last point I presume that the miners that mine the softer coals or the high volatile coals are paid the same as the miners who mine the low volatile coals?

A In Great Britain?

Q Any place?

A Oh, that must be true.

Q Costs aren't just going to escalate for the low volatile, metallurigical coal, all coal is going to escalate at the same time, presumably?

A In relation to the costs of production.

Q Yes?

A Of course, of course.

Q Now, sir, you yesterday had indicated that part of your background was the layout of a mine for Crowsnest Industries?

A Yes.

Q And I believe you oversaw that mine until Kaiser took over from Crowsnest Industries in '67 or '68, whenever it was?

A It depends. I am not quite sure what you had in mind by the word "oversaw". I did the planning of the basic mine layout, I returned from time to time to discuss modifications of that but I was in no way responsible for the day-to-day operation of the mine.

Q But you did watch it as it developed?

A I watched it as it developed.

Q And that mine plan that you prepared was then carried out until Kaiser took over?

A Until Kaiser took over, certainly.

Q Do you know whether Kaiser continued with it or not?

A Not specifically, no.

Q Generally do you?

A No, I don't. I have not seen the mine plan or the mine itself since that time.

Q I see. Now, Mr. Wardell, in your report you spend a considerable amount of time extracting portions of the various reports given to the company and making comments or criticism on those reports? You have characterized the first Landes Report in December of 1963 as having treated the matter superficially and at page 6 of your report, you in paragraph 1.11, you discuss the fact that Landes designated a same "indicated" when it should have been "inferred", indeed you say:

> "It would hardly have been rational to infer recoverable reserves at all."

You then later note that the Landes Report wrongly assumed, at page 7, that they could take 50 per cent of the entire coal mass. I believe that is what you say in paragraph 1.14?

A I don't think I say that, but --

Q Well, you say it was simply assumed that 50 per cent of the volume of coal in the ground could be recovered by mining. Is that not the entire coal mass?

A I merely state the assumptions that Dr. Landes made.

Q You are commenting on Dr. Landes' report, sir. Without going through all of the details, there are a number of examples indeed, you make comment on the second report, you refer to the Hulbert Report which you have done in your viva voce evidence referred to the fact that Mr. Hulbert described this as an immense field or an immense coal field and you refer to his "almost certainly there are sufficient reserves to fulfill any size of sale contract which may be contemplated".

Now, sir, at page 71, in characterizing, I think it is the company document of August 1969, which was given to the Japanese delegation, you say that that represented only about 10 per cent of the Landes and less than 5 per cent of the Hulbert calculations of total inplace reserves and was indeed a pale reflection of "immense" coal field?

A Yes.

Q Now, sir, when I read your brief I wasn't quite clear. Is your criticism of the experts or of the company who took the experts' advice?

A I don't think it is a criticism of any kind. I think it is a comment.

Q All right, is your comment relative to the experts' reports or the fact that the company took those experts' advice?

A Neither, it is relevant to the information.

Q Well, sir, you agree we are not here to criticize the prior experts?

A Of course, of course.

Q Indeed, at page 14 I think you make it plain, sir, that unlike

Q (continued) some of the other experts you take the worst assumptions and you recommend that, I believe, middle of the page, "It is therefore --". Did I say 18? I am sorry, I meant 14, middle of the page, paragraph 1.23, third last sentence:

> "It is therefore of extreme importance in coal mining project assessment, for the assumptions used in determining recoverable reserves to be clearly and definitively stated and to use worst rather than average or optimistic figures."?

A I think it has to be read in conjunction with the next sentence.

Q "If the worst presumptions justify pursuing the project there is no difficulty."

So you are taking a very conservative approach?

A No, I am saying -- may I read the next sentence too?

Q Please do.

A "If they do not, either the information is inadequate and requires amplification or, the project is unsatisfactory."

What I am -- if I may?

Q Please do.

A Explain, what I am really saying here is, you have to categorize what the assumptions are that you make and you have to, if you like, have a scale of the worst to the average and the best, and if on the worst assumptions you can make this is still a good looking project then you don't have any great difficulty.

Q You shouldn't have any great difficulty?

A Shouldn't have any great difficulty. If you have to make the

A (continued) best assumptions in order to have a viable project or an attractive project then I think you have to ask whether the information you have got is adequate, and if it isn't, whether you need some more, and what you have to do to get it, or you really have to reject the possibility that you have got a project. It is a question of whether one maximizes the opportunities or minimizes the risk. It is a situation that one has to look at with extreme care.

Q Where does one stop, Mr. Wardell?

A I beg your pardon?

Q Where does one stop?

A I am not sure I really understand that.

Q Well you say, if you take the worst, if I understand your answer, if you take the worst and it doesn't give you satisfactory projections then you have to got to get some more information?

A Correct.

Q Now, when do you stop?

A When you are satisfied that you have got enough information to make it a viable proposition.

Q Taking the worst?

A No, no.

Q Well, taking the worst from that additional information?

A You upgrade, if the worst assumptions, if I may try and put this in --

Q Please do, I would like to understand it?

A If you have an area with 100 million tons of coal in the ground

A (continued) on a relatively small number of reference points and you want to know how much of this is recoverable and on the information you have, on the worst interpretation you can make of that, you have got 20 million tons recoverable, on the best interpretation you may have 70 million tons, but there is no way at that point you can decide where the reality lies between 20 and 70, but if you get more drilling information and you do more exploration then your worst assumption is no longer 20, your worst assumption on the increased information probably changes this order from between 20 and 70 to between 40 to 60 and then on your worst assumptions you can still go ahead. So you change your assumptions by getting more information, inevitably.

Q But taking the worst of that additional information?

A Taking the worst of the total information.

Q Yes, thank you.

A Right.

Q Sir, at page 26 of your report you venture to suggest had the conclusions which are referred to in the prior paragraph been reached before discussions with the Alberta Resources Railway or the Japanese, such discussions would not have taken place without much more serious reservations as to the scale of operations and the long-term position. Now, the conclusion, sir, I think is the one set forth in the August '69 report, as I read the paragraphs prior to that one I have just quoted. My question really doesn't depend upon the date of that, sir. What discussions with the Alberta Resources Railway do you

Q (continued) refer to?

A I don't -- I am sorry, you know, this may be a very bad phrasing here. I know specifically of no discussions with the Alberta Resources Railway.

Q I see, fine. Now, sir, this morning at the immediate continuation of your evidence you went through with Mr. Stevenson and extracted the warnings or flags contained in these various reports?

A Surely.

Q Now, sir, these were warnings of problems that might be encountered?

A Correct.

Q And presumably it is best for anyone to be aware of the possible problems?

A Oh, unquestionably.

Q But, sir, every one of these reports, from which you've extracted the warnings, go on to make mining recommendations within the goals then contemplated?

A That's correct.

Q Sure. For example, Mr. Gardner's report says, according to your report at page 71, that the coal reserves were adequate. He recommended mechanical development in the south and a high degree of mechanization in the north, and that they go into the south area?

A True.

Q And the Weir Report said, "That the projections and cost estimates represented reasonable expectancy and were sufficiently sound and met decisions," et cetera.

A That's correct.

Q So, sir, really none of these reports say "Don't do it"?

A That's correct.

Q Yes. So to be absolutely fair about it, sir, these observations, these warnings take on significance when they are viewed in the light of actual experience. If you balance them as against the rest of the contents of those reports, which make mining recommendations, they don't say "Don't do it".

A That's absolutely right.

Q Thank you. Now, sir, you refer to the August '69 projection of the company -- I'm sorry, the July '68 projection of the company, which was given to the Japanese.

A July --

Q Or was it the August '69? Perhaps, I could just find that if you will bear with me for a moment. I'm sorry, it was the August '69 projection which was given to the Japanese?

A Yes.

Q Well, now, sir, the Japanese looked at that report.

A Yes.

Q And they had their own people, you've heard the evidence and maybe seen in the files, they had their own people look at the area, look at the coal in Grande Cache.

A Surely.

Q And indeed they depended upon that supply for their mills.

A To an extent obviously.

Q Well, not solely but --

A Surely.

Q -- to an extent of two million tons per year.

A Well, they didn't depend on that two million tons a year.

Q But they were hopefully depending on it.

A They were hopeful.

Q Yes.

A Yes.

Q But that's the point, having looked at all of this they accepted it as being sufficient to supply their needs to the extent of two million tons per year?

A Yes.

Q So, sir, it was not only the company that could be said to have been optimistic, I suppose we might also say the Japanese were

Q (Continued) optimistic in purchasing it?

A Yes, except that the Japanese weren't at risk, not in the strict sense.

Q Well, they were at risk to the extent, sir, that they had the contract and had to accommodate this two million tons, this projected two million tons per year in their mills?

A They had to accommodate that two million tons, but they had other markets where they could obtain their coal besides this.

Q Oh, if it didn't turn out.

A If it didn't turn out.

Q But did they have the contingencies waiting in the wings?

A No, the Japanese, I should think they did.

Q But we don't know that, sir.

A Of a certainty, no.

Q Yes, but the point is, are you suggesting they would have had a duplicate two million ton contract with someone else?

A No, not at all, Mr. Sabey. What I am suggesting was that they buy much of their coal on the spot market. They had opportunities to do this in the United States and Australia. I don't suggest they weren't at risk. I only suggest that they weren't in any sense in the same order of risk as the company.

Q Of course, and, now, sir, yesterday, in response to a question: "In September of '67, did the company have technological information to indicate how the No. 1 and 3 mines would be

Q (Continued) mined at an economic rate of recovery?", you gave a very lengthy answer, but in that answer you said two things. You said, "It's like most of engineering. You can engineer most things, it's only a question of what does it cost to engineer it." And you said you were forced in a way into making unverified and basically unverifiable assumptions.

A Yes.

Q You then do go on to say that at this time, that is September of '67, the best developed systems for highly mechanized underground mining were the room and pillar with continuous miner and shuttle car and belt, which was in the United States, and longwall which was in the United Kingdom. Do you recall that, sir?

A Yes.

Q Then to the question of, "How did you assess the prospects for recoverability of these reserves that were under consideration in 1967?" Your answer was that "Traditional yardsticks were used".

A Right.

Q "And that short of setting down and drawing very detailed plans about exactly --" I'm at page 1658, Mr. Stevenson.

MR. STEVENSON: 58?

Q MR. SABEY: 58. "And that short of setting down and drawing very detailed plans about exactly how one would mine and what areas could be extracted and what areas

Q (Continued) might have to be left in terms of ground control," you didn't see that there was a much better yardstick.

A Yes.

Q Now, sir, when you say "Traditional yardsticks were used", I presume you mean they were used by the company, McIntyre Porcupine?

A And their advisors, of course.

Q Yes, exactly. Now, sir, the decision that you refer to is dependent to some degree on ground control you've indicated.

A Yes.

Q Now, as I understand it, ground control conditions couldn't really be determined until you actually encountered them. Well, just let me go on, sir, "Indeed I think there has been indication that they didn't know the ground controls even in, or prior to August of '69, which is the time when some work had been done in the No. 4 seam of the No. 2 mine." In other words, ground controls are things that you fine as you go on.

A Or you make worse assumptions about it before you start.

Q Yes, or you conduct a highly intensive, lengthy and expensive drilling program or pilot program?

A Correct.

Q Now, sir, you then, over a couple of pages, 1660 refer to the August '69 company report again and you compare the reserves set out there, but, sir, that report was after the

Q (Continued) contract was made with the Japanese?

A Of course.

Q A year after, August of '68.

A August --

Q July or August of '68 was the letter of intent.

A Was the letter of intent, and I've always dated the contract from January '69.

Q That was the formal document?

A The formal document, sure.

Q Well, now, sir, it's hardly appropriate to refer to a report that came out a year later in context of a knowledge of recoverable reserve before the Japanese contract was made. Now, perhaps, you didn't intend to do that and, perhaps, I misunderstood what you were doing yesterday.

A Of course, to make it a criticism of something at a particular point in time or something that came to light afterwards would be unfair and unjust, I agree. What I would really like to say is I don't think that, I think the same information or very nearly the same information was available at the time of the letter of intent, as well as in August of 1969. I think there had been some revamping of this information, but I don't think during that period essentially a great deal more information in terms of drilling and exploration, in relation to these particular areas, had been done.

Q But you're not aware of the conclusions reached in that report had been reached prior to that date of August of '69?

A No, no.

Q Now, sir, you, over two pages later at 1662, you comment that based on the 1969 report and in relation to the coal then proved by that report, you conclude there were not sufficient reserves to sustain the contract in terms of total time and tonnage or in terms of annual output predicated.

A Right.

Q Now, sir, but that answer deals only with proved reserves in that report.

A Yes.

Q Or in the prior reports.

A Yes.

Q It excludes the factors of time and human ingenuity, I think that's the expression you used a couple of pages later, it excludes the factor of finding some method of working the seams more economically through improved techniques or equipment.

A No, I don't think it excludes that.

Q I see. Well, when you limit your answer to the reserves that are then proved with the techniques of the day, surely, it must be limited to that and not include or contemplate improvements in techniques.

A Well, I think the word "proved" here is used in a very clear

A (Continued) and definitive context. The word "proved" here is used basically in the geologic context that there are enough points of reference, I think Mr. McKelvie said this in evidence, there are enough points of reference to say what the quantity of coal in the ground that has been calculated is accurate plus or minus twenty per cent. I mean that's the strict definition of "proved".

Q I see.

A It has nothing to do with what is recoverable or what is economically workable. It's a geologic definition.

Q Well, but, sir, you do introduce the element of cost in the answer when you say, and I quote, "In relation to the coal that was then proved and where there was a reasonable expectation of money at an acceptable level of cost, my conclusion" et cetera. So cost and thereby techniques and/or equipment has to be a factor?

A Fine. The reasonable expectation of mining was related to the flat lying areas and it was only for the flat lying areas that detailed costs had been developed.

Q And that's the point I want to make, sir.

A Right.

Q And so it was limited in its scope and your comment is therefore equally limited in its scope?

A Yes, but it doesn't preclude, if I may put it this way, it takes the situation at that point in time, and I totally

A (Continued) agree with you about this, but it doesn't preclude that there may be some development of mining techniques or mining equipment which may change the picture of mining in the areas which have been specifically excluded.

Q All right, sir, if it doesn't preclude them does it accommodate for them?

A No, it leaves them in a kind of limbo.

Q Exactly.

A It says, "We don't know enough."

Q Exactly. And equally, sir, it does not accommodate for reserves, some of which were then or may then have been completely unknown and may then have qualified because of the lack of other known data?

A That's correct.

Q Now, one of the advantages that a lawyer has, sir, is having had the transcript and I don't want to take undue advantage of that, but at page 1664, Mr. Stevenson put the question to you: "Now, let's look at the situation without benefit of hindsight, look at the financial analysis that the company had and the assessments it had when it made its predictions in 1968 or thereabouts, which I think you referred to at pages 63 and 64 paragraph 2.68," and then you discuss the economics of longwall in 1968 or 1969, and the only point I want to make, Mr. Wardell, is that was after the Japanese contract, if you will accept the date of the letter of intent as being

Q (Continued) the date of the contract, that is July of '68.

A Yes, I beg your pardon, Mr. Sabey, I'm not quite clear, what was after --

Q Well, your comments which then follow which dealt with the economics of longwall in 1968 or '69 has to be after the date of the Japanese contract.

A Oh, in point of time, yes.

Q Yes, and I wanted to be clear that it's in that context.

A Sure.

Q And to be fair --

A If I may have a moment.

Q Please.

A Because I'm not absolutely sure about whether I was here speaking of the 1969 report or not. You referred me to pages 63 and 64.

Q Well, sir, the question that Mr. Stevenson put to you referred to those pages, paragraph 2.68.

A Surely. What I'm saying is where I have been reviewing this information, I am not sure that the information I was reviewing or speaking about here was August, 1969 or earlier, but if I may have a minute I could probably just verify that.

Q Please do. I tried to determine from your report and I couldn't with any certainty. Well, sir, perhaps, it would assist you if you look at page 60 and 65 at the long answer which begins with the words "At this time 68 or 69" and you then go on to discuss the longwall system and that's really what I

Q (Continued) direct my question to. That discussion did deal with the period '68 or 9. You then in that answer discuss the economics of the longwall and the history of it in Europe.

A Yes. All I'm saying there is that around this time of '68 and '69, I think the document I was referring to, or that you referred to, was the 1967 McIntyre Porcupine second feasibility study and not the August 1969 report.

Q But quite aside from that, sir, your answer yesterday deals with '68 or '69?

A In relation to longwall.

Q Yes, in relation to longwall, exactly.

A But if I may, it is not intended to be contentious. I mean the same would have been true of 1967 or '66.

Q And to be completely fair about it, sir, at page 1667 at the bottom of the page, you said, and I quote: "And the problem here was to decide in looking at this project which particular point within this kind of range one would predict that machines in these conditions would perform."

A Surely.

Q "And it's a very, very difficult question to put a figure to in the absence of particular experience in that locality."

A Correct.

Q Now, sir, you then went on to discuss with Mr. Stevenson what would have been desirable. Then you mention that drilling information had not been obtained to any great extent, but then you quite fairly noted that drilling was extremely difficult

Q (Continued) in these conditions, that there was rough, rugged topography and that every hole required a catroad to the site.

A Sure.

Q And, presumably, sir, that may raise the ire of some of our environmentalists, and you also mentioned a considerable depth, I think you mentioned eighteen hundred feet, as all the problems contributing to the considerations of whether one should undertake this drilling program.

A That's correct.

Q You also pointed out, sir, that it would take considerable time and money to conduct an extensive program?

A Yes.

Q And indeed I think your report to the Commission refers to two reports, one of which indicated it would take nine months, the other upwards of fourteen months, and the first one would take a million dollars, the other, I think, was a million and three quarter dollars. Now, sir, in the first half -- I'm sorry, in the last half of 1968 and '69, the company simply didn't have nine or fourteen months to conduct drilling programs, did they? They had a contract to meet?

A Unless they went back and asked for a deferment of the starting date.

Q Oh yes, of course, and then you get back to the considerations of the economics of conducting this lengthy and extensive drilling program?

A Correct.

Q You also pointed out one of the problems was that there was no geology then known to be analogous unless the Crowsnest area might have been considered.

A Yes, that was the nearest in point of geography and in point of the general Rocky Mountain conditions, not necessarily Crowsnest, but there was also Coleman Collieries and to a certain extent Canmore Collieries.

Q And, of course, those are some miles distant, sir, and there may be variations between the geological conditions?

A Oh, surely.

Q And indeed, sir, we heard Dr. Barron tell us yesterday that there were differences in the geology just across the river between Numbers 2 and 5?

A Of course.

Q You also suggested the possibility of a pilot operation.

A I'm sorry, I didn't suggest the possibility. The possibility was suggested by some of the McIntyre personnel.

Q You discussed that with Mr. Stevenson yesterday?

A Yes.

Q Now, and again you indicated that that would involve mining on a scale which would again involve time and cost.

A Of course.

Q Now, sir, but from the difference in geology, a pilot operation in No. 2 wouldn't have been of much value to tell them what to expect in No. 5, would it?

A Of course, it would have been of value. It may not have been, the two situations may certainly not have been strictly analogous, but you would get a better analogy to No. 5 from doing an exploration in No. 2 area than you could conceivably get from anywhere else.

Q But, sir, they didn't run into the same problems in No. 2 that they did in No. 5.

A Oh, very largely they were problems of the same nature.

Q Well, I suppose falling rock is falling rock or falling coal is falling coal, is that what you're saying?

A No, I would say that, of course, falling rock is falling rock, of course, falling coal is falling coal, but also depth is depth, also floor heave is floor heave, also instability of the sides is instability of the sides, --

Q Sure.

A -- also faults in the roof are faults in the roof. There were many problems that were identical in both mines. I don't say that they had two totally analogous situations.

Q Quite.

A But you would have had a great deal more information about the likely condition of No. 5 from a pilot operation in 2 than you would have had any other way.

Q But, sir, but sufficient that they could predicate a reasonable operation in 5 based on the information gleaned from 2?

A Yes.

Q Well, sir, that doesn't square with what Dr. Barron indicated that because of the one geological difference there were different considerations in the mine.

A Different considerations in the mine?

Q Yes.

A I don't remember Dr. Barron saying that.

Q I see, well he talked about --

MR. CRUMP: Mr. Wardell, if you would speak to the court reporter, perhaps, we could hear also.

A I do beg your pardon.

Q MR. SABEY: Well, sir, you do agree that the two situations are not completely analogous?

A I do.

Q Now, what is the difference, in your view, that doesn't permit you to agree that they are completely analogous?

A Two essential differences. The first is that the No. 5 mine is a slightly anticlinal structure and the No. 2 mine is a slightly synclinal structure. According to the work carried out by Dr. Barron, according to the generosity there is a difference in the thickness of the caprock of the No. 4 seam as between the 2 and the No. 5 mines, and according to Dr. Barron, there are certain faults, it's difficult to really call them faults, certain disturbances in the immediate roof of No. 5 which are more accentuated or more general in that area than they are in No. 2. Now, those are the essential

A (Continued) differences between the two situations, as I understand them.

Q And indeed Dr. Barron suggested that the No. 5 mine might have been laid out differently to accommodate for that very difference?

A Unless Dr. Barron could have suggested coming in about ten miles the other side of the mountain to work east or west, I don't know how he did it.

Q Well, that's another point, Mr. Wardell.

A Surely.

Q But, nevertheless, that difference was of considerable significance to Dr. Barron?

A Well, it was of considerable significance to him. I wouldn't like to say that it was necessarily of the same significance to me.

Q So experts vary, do they?

A Oh, to an extent.

Q Thank you, Mr. Wardell. We have certainly seen that, I think, in going through these various reports. Sir, indeed even if they had run a pilot project in No. 5 at where the various entries were driven, and I presume that's where you had to start your pilot project, that wouldn't have indicated the problems that they were going to get to later on which they did subsequently encounter. You said in your report at page 83, "The further in they went the worse it got. The gradient

Q (Continued) appeared to pitch more steeply approach the approach or the arbitrary limit and the roof conditions and depth of course were bad due to the depth of cover." Is that correct?

A Yes, I'm not really -- what you say is correct. I'm not really clear what it is you are asking.

Q Well, my point is, sir, if they get these worse conditions, if things get worse the deeper in they go, how much is a pilot project going to tell you out near the entry to the mine?

A Well, I mean the effective depth is predictable anyway. You know perfectly well you're going to get a higher stress the greater depth you, so there is no difficulty about that.

Q All right.

A What you need from the project plan is a better idea of the structure, and you do the project, the development project in preference to in this context doing a lot of drilling which may be difficult and expensive.

Q Oh, I appreciate, sir, what you're saying is it is better than doing nothing?

A I think in totally unknown conditions it's almost indispensable, otherwise you work totally in the black, in the dark.

Q Well, sir, let's accept that. But my question then is in view of your answer yesterday, and I'm reading at page 1680:

Q (Continued) "I think there were problems because the coal was rather soft." Now, you'd get that from a pilot project. The coal presumably is as hard in one area the same as in another within the same limits?

A Yes.

Q All right.

A I think the coal was soft, which is again something that could be known without doing an extensive pilot study.

Q But you say, and I'm continuing, "And as the entries advanced there was greater cover and came under pressure and there was a certain amount of spalling from the sides of the pillar" and I gather you to say that one should normally assume that to be the case without even a pilot project?

A That was predictable.

Q Okay. "By October '69 problems of floor heave had begun to make themselves felt."

A Yes.

Q Now, sir, are you saying that the pilot project would have developed that or that the pilot project was necessary for you to realize or anticipate that?

A The pilot project would certainly develop that. The pilot project, as I recollect, was to cover a period of 40 months at a cost of 1.9 million dollars and to produce 132,000 tonnages. That very, very roughly is equivalent to 20,000 feet of development work, and that is approximately the

A (Continued) amount of work that was done during 1969. So merely taking the proposal that was made by the company, what it was saying was that we shouldn't, as I understand it, "We shouldn't come to any firm decisions. We don't know what the conditions are. We can't properly determine our costs for others until we have done this" and this is very nil --

Q A year's --

A A year's work or equivalent to what ultimately became the first year of development in the No. 2 mine.

Q I see, but turning back to the No. 5 mine, I'm sort of unclear on that, I'm trying desperately not to be obtuse, do I understand that the further in they went the worse conditions got?

A Some of the conditions worsened because of the fact of the distance of travel.

Q And were therefore predictable?

A And were therefore predictable. Some of the conditions arose as a matter of time, for instance, and as a matter of the total area developed at any particular point in time.

Q Exactly, yes, and were therefore predictable with any experience of general mining, or coal mining?

A No, I think some of them were predictable, but not by any means all, and if what we are asking about here is the predictability of the physical and geological conditions we are also really looking not only at the predictability of those but at the predictability of the performance of the equipment, which was of extreme importance in having some clear notion of what costs were likely to be.

Q I am not as concerned with predictability. I am really trying to determine whether or not a pilot project, sir, near the entrances would fully equip you for the conditions that they found as they went further on in?

A What I am saying sir, is this, that a pilot project of the scale envisaged and proposed would have done that.

Q Well, sir, what scale, when does the baby stop being a baby and become a young man? When does the pilot project become the mining operation?

A The pilot project was clearly defined in terms of its time and extent and cost.

Q And those were arbitrary delineations?

A I don't understand the use of the word arbitrary in the sense, they were made by the company.

Q Yes, based on what consideration? I mean when you say they recommended a pilot project within a certain number of dollars and a certain number of days and months, what was the basis for that determination? I presume it was arbitrary?

A No, I think they decided first what area they had to expose in order to get the information they wanted. There was nothing arbitrary about that.

Q Okay, now let's just stop right there.

A Sure.

Q Now how can they possibly know what area they got to develop for the pilot project to be fully equipped to know what they are going to find throughout the whole mine?

A Well, I think the best thing to do is to look at it on a plan.

Q All right.

A This is the No. 2 mine.

Q Can we deal with the No. 5 mine, that is the one we have been dealing with in the example.

A The pilot project was related to No. 2 mine --

Q At least recommended? Fine. All right --

A What was known at the time this pilot project was conceived and proposed was very largely the outcrop position of No. 4 seam, the existence of the Barrett anticline in the northeast, the existence of another anticline on the other side here, and I don't remember exactly the number of bore holes, two or three in the distance of approximately two miles between Smoky River and Sheep Creek. The structure, the shape of the coal basin had been determined largely from the information obtained along the Smoky River, here, from information obtained along the No. 4 seam at Sheep Creek, and from the relatively few number of bore holes in the middle, and the geological structure had been inferred from this not very extensive information, and as I understand the proposal as it was made it was to drive in the main entrance in the approximate position which they ultimately occupied,

A (Continued) and the tonnage allocated and the distance of driveage would have been sufficient virtually to block out the whole of that area. To circumscribe, if you like. That would have given certainly a great deal more knowledge and fairly definitive knowledge of the structure which certainly have gone from zero cover to 1300 feet of cover here to something rather more here and to cover 1400 feet at this point, and if not totally comprehensive in terms of what had happened here would have been absolutely invaluable information from a planning point of view, from a structural point of view, from the point of view of costs, from the point of view of the operation of the equipment.

Q Sir, you would do this type of planning before the plant was built, this type of pilot project?

A This is what was proposed.

Q Yes, now would you forget the pilot project that was proposed. I want to deal with pilot projects as a general concept. There was not one proposed for No. 5?

A No, that is correct.

Q Now, sir, I suppose in No. 5 mine to get this totally complete or invaluable information on it you have just suggested for No. 2, one would have had to drive to the same general areas that they have already driven to to find out that the pitch was changing and to confirm the other matters?

A In terms of the structure certainly they would require that amount, but in terms of many of the other factors that were being considered out of the development project they didn't have do to that.

Q Yes, but they would have had to go to very nearly the same point that they did in No. 1 and No. 2 east?

A To be sure --

Q Yes.

A -- of the structure --

Q Yes.

A -- other than by drawing.

Q Yes. We are talking of a pilot project which is not drilling, and the same with the second and third north?

A Oh yes.

Q Really you are talking about the pilot project going to the same areas that the actual mining went to?

A Yes.

Q Well, Mr. Wardell, what I find difficult to understand then is what is the difference between a mining project and a pilot project?

A Well, the essential difference I think I can put in this way, if you don't do a pilot project or if you do a pilot project then you reach a state of information which informs you about whether you have a go or no go situation, whether you are going to go ahead with the whole project or not. You may have taken 14 months, you may have spent 2 million dollars, and you may have conluded at the end of that time that there is no way you can mine this satisfactorily and economically, in which case you have lost 2 million dollars.

Q And 14 months?

A And 14 months. So the cost, 14 months, but this essentially

A (Continued) is preferable to spending a very large sum of money and running the risk of a complete failure of the operation or not operating at some -- an acceptable level of cost.

Q Fine, thank you. Now at page 1675, I am sorry, Mr. Wardell. I got the wrong reference there. Back at page 1680, you suggest that the 1969 and '70 production figures came within a range of 70 to 80 per cent of the projected production figures, and I think you set those projected production figures out in your report at 18 or 19 -- 18 and 19.6 tons. I will just find that reference. Page 75, I think Mr. Wardell. Yes, 2.83, the productivity scheduled at full production for mines 2 and 5 respectively, for all underground workers, was 18.0 tons and 19.6 tons. You see that at the beginning of paragraph 2.83?

A Yes.

Q Now, sir, I think yesterday you indicated that was rather high and made a comparison with the U.S. standard at 60 or a lesser figure?

A Yes.

Q But, sir, if you will look at page 90 of your brief, paragraph 3.11, you quote the 1971 average around 18 long raw tons per man shift for all underground workers?

A Yes.

Q You note that did fall away in '72 but in your answer you were discussing the projections for '69 and '70?

A That's correct.

Q And indeed, you do say at the beginning of that paragraph,

> "Notwithstanding the difficulties, however -- including those of shortage of crews and maintenance men - productivity, measured in terms of output per man shift underground was quite high,"

and conclude that paragraph by saying,

> "In fact, the productivity achieved during 1971 was not so far short of what had been anticipated in August 1969 and was high by any comparative standard."

A Yes, that is absolutely right.

Q All right, I just wanted to clarify that, sir. Sir, going back to page 59 of your brief, you have dealt with a subject that you dealt with more extensively yesterday, at the bottom of paragraph 2.63, you say that -- you recite the poor history of longwalling in Europe?

A Yes.

Q Now, sir, was there any indication of that poor history of longwalling in any of the reports given to the company that you came across?

A No.

Q Was there any recitation of that poor history in the report that you gave to the company when you were asked to comment on their longwall by Mr. Cook?

A No.

Q Thank you. Now, sir, at page 83--

A I might say, sir, if I may, if I may just make a comment --

Q By all means.

A Mr. Cook was as well aware as I was. I didn't need to make that comment to Mr. Cook. Mr. Cook was a mining engineer --

Q Did you discuss it with him at that time?

A Yes, I did indeed.

Q But you didn't see fit to put it in the report?

A I wasn't asked to discuss the question of productivity.

Q Sir, I want to be clear, in your report or in any other report to the company recited that bad history of longwalling?

A To the best of my knowledge that's true.

Q Now, Mr. Cook or someone else may have had that knowledge?

A Yes.

Q Now, sir, turning to page 83, paragraph 2.5, you indicate first of all that pillaring operations were not successful in extracting all, or even most of the coal, in the longwall panel sections. And this is in No. 5 mine, sir?

A Yes.

Q Excuse me for one moment. Oh yes, you concluded that discussion, you raised the question of the depth and the seam gradient was approaching the 20 per cent from the horizontal, and you then conclude by saying,

> "These entries were travelling down the flank of the anticline and could only have continued under increasing depth of cover and probably with increasing seam gradient. There could be little advantage in continuing them further."

Now, sir, I want to be clear the area you are speaking of on that plan, KW9 I believe, maybe it is 6. It is the one with

Q (Continued) No. 5 mine anyway.

A Sorry, would you like to ask me the question again, please?

Q Yes, you are talking about the pillaring operations not being successful and these entries were travelling down the flank of the anticline and could only have continued under increasing depth of cover. Which entries do you speak of?

A These.

Q You are talking about No. 1 and 2 east, is that correct?

A That's correct, the first and second east.

Q All right, thank you, and at that stage the company had withdrawn from that, or the operations had withdrawn from 1 and 2 East to 4, 5 and 6 I think it is, which is up in the block, in the blue area, up in here, up in this area where they were depillaring?

A Sir, I simply can't say that they had withdrawn from this area --

Q Well, they weren't operational in 1 and 2? They weren't mining, actively mining 1 and 2?

A They weren't actively mining 1 and 2 at the date of closure.

Q Yes.

A In which case my information is incorrect, because my information shows that mining was going on here up to January, to the end of 1972.

Q Mr. Wardell, it is my information that the company was not advancing faces 1 and 2. They were brushing --

A It may be so, but brushing is an operation so it did not occur to me to say that there had been any definitive end to the --

Q I don't mean to suggest that they had abandoned --

A No.

Q -- I simply mean the intensive production and the advancement of the faces had ceased in those areas for the time being?

A For the time being, I accept that.

Q MR. PATCHING: May I ask why they would be brushing the entries if they were not going to continue working there?

A There is no way I am afraid I can answer that question.

MR. SABEY: I might develop that, Mr. Patching, as I proceed. I hope I am successful in developing it.

Now, sir, and they were then pillaring in this other area of 4, 5 and 6?

A At the end of 1972?

Q Yes?

A The areas that I have as being pillared during the last six months of 1972 are these areas, a little here and here.

Q Those are 4, 5 and 6?

A And here.

Q The top 4, 5 and 6 --

MR. STEVENSON: On this map they are sort of yellowy green.

MR. CRUMP: In any event it will be recorded on the transcript, those areas or these areas.

Q MR. SABEY: This bottom is first east, second third, fourth, fifth and sixth, if I can use that rather than green and blue and yellow.

A Surely.

Q So the pillaring was going on in 4, 5 and 6 east, the top three?

A In that general area.

Q Yes, thank you. That is all I think we need that map for for the time being. Now, then in paragraph 2.6 you say,

> "In early 1972, the anticlinal structure was clear enough to justify turning off a further set of main entries to the northeast to follow generally the swing of the seam contours."

Now where would that be from on this map, sir? I am sorry.

A This point on the second east.

Q First and second?

A Yes. Turning off to what was subsequently called second north.

Q Okay, fine. And you say,

> "I have some difficulty in understanding the particular logic of this since most of the coal to the east of these entries would be to the dip of them and at considerable cover."

A Yes.

Q Now, sir, presumably with the cessation of taking the faces further on 1 and 2 east the company would have had to further brush the entries to get back into the faces at 1 and 2 east?

A That I don't know.

Q You don't know, you don't know whether or not it might have taken the company upwards of six months to rebrush and retimber to get back to the first and second east faces, to mine at those faces?

A No, I would presume because operations were going on at least

A (Continued) in the first east entries during the latter half of 1972 that that area was not inaccessible.

Q Well, sir, but that is a presumption that would depend entirely upon what actual operations were being carried on?

A It is a presumption, I mean only, I am quite ready to admit, only people who are fully aware of the circumstances at the time of the mine could say that, but it was a presumption that could be made looking at the mine plans.

Q Yes.

A I couldn't do anymore than that since No. 5 was closed.

Q I see, but you were aware that brushing was necessary in 1 and 2 east?

A Not as specifically necessary in 1 and 2 east as opposed to anywhere else.

Q Well, sir, even assuming that you didn't have to do this extensive brushing and retimbering, and it wouldn't take upwards of six months to get there, why would you expect those faces to be any more successful at depillaring than was the case in 4, 5 and 6 where you say it was not particularly successful? This has a deeper cover?

A I am sorry, which had the deeper cover?

Q 1 and 2?

A Deeper cover than?

Q 4, 5 and 6?

A 4, 5 and 6 at No. 5 mine, fine. I think there was, the reasoning for which I took in relation to this, which was partly related to the circumstances as they were also developed in No. 2 mine were this, where quite extensive and evidently looking not only at

A (Continued) the plans, but also talking to people at the mine, areas of depillaring had taken place, they had taken place in relatively narrow panels. In other words, three or four headings had been driven forward a certain distance, and then that section had been totally retreated. Perhaps I can show it best by looking at the No. 2 mine plan because to the best of my knowledge it was never really used at the No. 5 mine.

There had been similar difficulties at No. 2 mine as at No. 5 in depillaring some of the areas that had specifically been laid out for longwall panels. As you can see from this the fourth west I think it would be called, the section, by no means was it possible to recover all the coal, and extreme difficulties were being experienced even when I visited the mine in recovering all the coal in the third west district. But in this area and this area, which I think can probably be described as second and third west, where a relatively narrow panel had been driven, three or four entries, it had been impossible to drive those and depillar it with good success, good recovery and according to my information a good productivity, and the same appeared to have been basically true in this panel here which was a part of the original main entry system intended to go through to Sheep Creek.

So it would not seem to me, in looking at the plan and talking to the people at the mine, that in depillaring in No. 5 one would have the same sort of difficulties in depillaring the first east, the second east and the second north sections that one had had in depillaring the old, the areas that have previously been laid out for longwall.

Q Thank you. Now, sir, does the conclusion that you reach in these two paragraphs to which I referred, vary if one takes as the arbitrary figure 25 degrees rather than 20?

A That one wouldn't seek -- I am not very clear about your question.

Q You make reference to what has been indicated as being the arbitrary 20 degree limit --

A Yes.

Q -- now does it make any difference to your conclusions about either reserves or as to the mineability of this if you use a 25 degree gradient rather than 20?

A Are we speaking about No. 5 mine?

Q Yes.

A And depillaring in No. 5?

Q Yes, and or continuation of No. 5 mine?

A If the intention is to go on operating with continuous miners, shuttle cars and so on, then I think the difference between 25 degrees and 20 degrees is a significant one.

Q Quite. So the statements which you have made in paragraph 2.5 and 2.6 are predicated, sir, on the assumption or the information that was given to you that the No. 1 and 2 east faces were being actively mined and advanced?

A No, it wasn't certainly not predicated on being actively mined and advanced.

Q But certainly that those areas would not require brushing and retimbering for a period of up to six months? That you had immediate access?

A No, no, I don't think they were predicated on the probability

A (Continued) that there would necessarily be immediate access. I had, it would have been perfectly possible in the circumstances that I saw them, and I had believed that those entries were part of the general reconditioning of the mine, if I may put it like that, that took place during the latter part of 1972, but even where I not so it would still have been possible to brush them and retimber them and retreat those sections by concentrating the depillaring in the earlier periods in the other parts of the mine.

MR. SABEY: Mr. Chairman, I am going to be longer.

MR. CRUMP: You have some considerable cross-examination yet?

MR. SABEY: I have several other areas that I intend to cover.

MR. CRUMP: Then I think we will adjourn until tomorrow morning at 9:30.

(The hearing was adjourned.)